

METHOD FOR MAKING DAMASCENE INTERCONNECT WITH BILAYER CAPPING FILM

Abstract

A method for making a damascene interconnect structure with a bi-layer capping film is provided. The damascene interconnect structure comprises a semiconductor layer and a dielectric layer disposed on the semiconductor layer. The dielectric layer has a main surface and at least one damascened recess provided on the main surface. A copper wire is embedded in the damascened recess. The copper wire has a chemical mechanical polished upper surface, which is substantially co-planar with the main surface of the dielectric layer. After polishing the upper surface of the copper wire, the upper surface is pre-treated and reduced in a conductive plasma environment at a temperature of below 300°C . A bi-layer capping film is thereafter disposed on the upper surface of the copper wire. The bi-layer capping film consists of a lower HDPCVD silicon nitride layer and an upper doped silicon carbide layer.